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ON THE INTEGRITY OF *RESTREPIOPSIS* (ORCHIDACEAE)

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Restrepiopsis in subtribe Pleurothallidinae was erected by Luer (1978b) to include six species transferred from *Restrepiella* Garay & Dunsterville and three newly described species. *Restrepiella* was further reduced to monotypic status by transfer of two species to *Dresslerella* (Luer, 1978a), a move firmly supported by later anatomical investigations (Pridgeon, 1981).

Luer (1978b) argued that *Restrepiopsis* can be distinguished from *Restrepiella ophiocephala* (Lindl.) Garay & Dunsterville by slender secondary stems with several imbricating sheaths, a thinly coriaceous leaf, reduction of the spathe to an inconspicuous bract, and by a membranous perianth. Garay (1980) subsequently reduced all species of *Restrepiopsis* to synonymy with *Restrepiella*, saying only that both of these genera "have the same circumscription."

In the course of much more comprehensive systematic studies throughout the Pleurothallidinae (Pridgeon, 1982a, b), the anatomical differences between leaves of *Restrepiella ophiocephala* on one hand and those of *Restrepiopsis ujarensis* (Rchb. f.) Luer and *Restrepiopsis viridula* (Lindl.) Luer on the other hand were catalogued and are detailed here.

MATERIALS AND METHODS

Procedures for light microscopy were identical to those described in Pridgeon (1982a). Voucher specimens of the three species examined have been deposited in the herbarium of Florida State University (FSU) or the Marie Selby Botanical Gardens (SEL).

OBSERVATIONS

Epidermis. Sunken, glandular trichomes occur infrequently on both leaf surfaces of *Restrepiella ophiocephala*, but generally only on the adaxial surface in *Restrepiopsis.* Cuticle thickness ranges from less than 3 μm in *Restrepiopsis ujarensis* to 20 μm in *Restrepiella ophiocephala.*

In surface view cells of all species are polygonal, rectangular, square, or elliptical. Anticlinal walls are thick (5-7 μm) in *Restrepiella ophiocephala*, but thin (less than 3 μm) in the two *Restrepiopsis* species (Table 1). In transection cell shape varies from dome-shaped, rectangular, peg-shaped, square, elliptical, to isodiametric. Marginal cells of *Restrepiella ophiocephala* are anticlinally rectangular, dome-shaped, or triangular, but those in *Restrepiopsis* are elliptical.

Stomata are restricted to and flush with the abaxial epidermis in all species. Mean lengths and widths of guard-cell pairs are listed in Table 1. Using the F-statistic, stomate measurements of *Restrepiella* are significantly different from those of *Restrepiopsis* at the 5% level of significance.

Hypodermis. All three species possess a multiseriate adaxial hypodermis, although that of *Restrepiella ophiocephala* is more substantial than either of the two *Restrepiopsis* species (Table 1). In transection cells of the upper layers are polygonal, ovate, or isodiametric, while cells of the lowest layer are anticlinally elongated and elliptical to trapezoidal. A uniseriate abaxial hypodermis of polygonal or elliptical cells occurs in all three species. Spiral

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thickenings are present in hypodermal cells of *Restrepiopsis ujarensis* and *R. viridula* but not in those of *Restrepiella ophiocephala.*

Mesophyll. Chlorenchyma is well-differentiated into palisade and spongy layers in all three species, but palisade is much more developed in *Restrepiella ophiocephala* (Table 1). Palisade cells are rectangular, elliptical, or trapezoidal in transection. Spongy mesophyll of all species consists of ovate, elliptical, or isodiametric assimilatory cells and spirally thickened idioblasts. In *Restrepiella ophiocephala* the idioblasts are uniformly distributed, but in both *Restrepiopsis* species the idioblasts are concentrated in one transverse band between two chlorophyllous layers, an upper layer associated closely with vascular bundles and a lower layer adjacent to the abaxial hypodermis (Table 1).

Vascular bundles. In all three species the collateral vascular bundles occur in a single transverse series just below the palisade mesophyll. Bundles are of four or five size classes. Those of the largest size class in *Restrepiella ophiocephala* possess a sclerotic sheath of one or two adaxial rows and three or four abaxial rows of fibers. The largest bundles of *Restrepiopsis ujarensis*, however, possess only a few adaxial fibers and one row of abaxial fibers. Marginal bundles are oriented xylem uppermost in all species.

Xylem consists of tracheids with scalariform and circular pits, libriform fibers, and parenchyma. Phloem consists of sieve-tube elements, companion cells, phloem fibers, and parenchyma. A uniseriate row of fibers separates xylem and phloem tissues in all species.

Table 1. Anatomical data for *Restrepiella* and *Restrepiopsis*.

Leaf Character	*Restrepiella*	*Restrepiopsis*
Epidermis	Thick anticlinal cell walls; primary pit-fields conspicuous	Thin anticlinal cell walls; primary pit-fields not conspicuous
Mean lengths and widths of guard-cell pairs	27.44 × 26.32 μm	31.22 × 30.24 μm
Adaxial hypodermis	6 or 7 layers; spiral thickenings absent	3-5 layers; spiral thickenings present
Chlorenchyma	Palisade: 4 or 5 layers Spongy: Uniformly distributed	Palisade: 1 or 2 layers Spongy: Bilayered
Vascular bundle sheaths	Numerous fibers	Few fibers

DISCUSSION

One of the outstanding developments in current systematic practice is the broadening of the concept of what taxonomic investigation should entail (Metcalfe, 1979). All plant characters, immediately visible or not, are criteria for determining relationships (Dressler, 1981). Williams (1974) demonstrated the value of vegetative characters, generally considered to be more conservative than floral elements, in orchid systematics and particularly in Oncidiinae.

In a group as diverse and taxonomically difficult as subtribe Pleurothallidinae, it is absolutely necessary to search beyond superficial, morphological similarities, many of which represent evolutionary convergences and which have formed the basis for several erroneous, artificial generic circumscriptions in the last two centuries.

In addition to the morphological differences cited by Luer (1978b), *Restrepiella ophiocephala* is anatomically distinct from *Restrepiopsis*, further borne out by multivariate analyses using 45 variables (Pridgeon, 1982b). Factor analyses show that *Restrepiopsis* is more closely related to *Restrepia* HBK than to *Restrepiella* (Pridgeon, 1982b).

The use of anatomical features in systematic treatments needs no apologia. Comparative anatomy has become an integral tool in understanding relationships at all taxonomic levels. Unfortunately, it is rarely invoked in orchid systematics, due in part to the relative scarcity of scientists actively working on Orchidaceae. But to unravel all the subtle intricacies in the phylogeny of "problem groups" such as subtribes Pleurothallidinae, Dendrobiinae, Oncidiinae, and Bulbophyllinae, it is essential to employ not only external morphological characters, but also anatomical, palynological, phytochemical, and cytological characters. Only then can orchid genera be established as truly natural entities.

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